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AUTHOR Tips, Martha; And Others
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ABSTRACT

A 64-item analogy test was developed and administered to 55 college students enrolled in a noncredit reading improvement course to assess the effects of an instructional unit in taking analogy tests. The instructional unit was a 35-page self-instructional booklet that described the most common formats of analogy testing, defined eight types of relationships (degree, part/whole, action/object, cause/effect, synonyms, antonym, grammatical, and numerical), presented general "rules of thumb" for practical applications, and provided a review test. The results, though tentative, suggested the following conclusions: college students can improve their analogy test performance as a result of instruction, but such instruction may be no more effective than the practice effects of simply taking repeated analogy tests; instruction does not seem to favor particular types of analogies; items requiring responses in the second position are the easiest, while items requiring responses in the third position are the most difficult; and both vocabulary and reading comprehension are highly correlated with analogy performance. (RL)

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Martha Tips
Reading Center
Southern Methodist University
Dallas, Texas 75275

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The Effects of Instruction in Verbal Reasoning
Strategies (Analogies) in a College Reading Improvement Course

Martha Tips, Eugene A. Jongsma, Ronald E. Pound
Southern Methodist University

Introduction

Analogies are being used with increased frequency on a variety of standardized aptitude and admissions tests such as the Graduate Record Examination, Miller Analogy Test, and the Graduate Management Admissions Test. Their widespread use is likely due to the belief that they provide an efficient measure of higher level reading-reasoning skills.

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Although some attempts have been made to identify the cognitive processes used in solving analogies (Gentile, et al., 1969), such processes are complex and not yet fully determined.

Students frequently express concern over taking analogy tests largely because they feel unprepared for the types of reasoning required or because they are not acquainted with the format used. Studies have consistently demonstrated that the analogy test performance of college students improves as a result of the practice effect of taking repeated analogy tests (Spielberger, 1959; Colver and Spielberger, 1961; Colandarci, 1960; Moore, 1971). Furthermore, practice effects seem to have the greatest benefit for low-ability students.

The major purpose of this study was to assess the effects of an instructional unit designed to teach students how to take analogy tests. The study attempted to answer the following research questions:

1. Can college students achieve significantly higher scores on a criterion analogy test following instruction in analogy test-taking?
2. What effects does instruction have on particular types of analogies?
3. Are certain response positions more difficult than others?
4. What is the relationship between reading performance (vocabulary, comprehension, and rate) and analogy test performance?

Procedure

Sample

A total of 55 college students enrolled in a non-credit reading improvement course during the Spring semester, 1978, participated in the study. The students ranged from freshman through senior levels and represented a normal distribution in reading ability as determined by the Nelson-Denny Reading Test.

Design of the Study

A pretest-posttest control group design was used. Because of administrative constraints, classes rather than individuals were assigned to treatments. The investigators felt justified using this approach since there was no evidence that the classes differed significantly in reading ability, class standing, or any other major variable.

Development of the Treatment

A 35 page self-instructional booklet was developed which students could work through independently at their own pace. The booklet contained four major sections. The introductory section explained the most common formats used in analogy testing. The second section, the heart of the booklet, defined eight types of relationships and gave examples of each with sample practice items. The third section presented general "rules of thumb" which could be applied to nearly all types of

analogies. The final section consisted of a short eight item review test with feedback to give students opportunities to apply what they had learned.

The booklet was limited to teaching eight major types of relationships. These are listed below with a sample item to illustrate each type.

1. Degree

FRUGAL : PARSIMONIOUS :: GENEROUS :

(a. miserly b. benevolent c. philanthropic d. garrulity)

2. Part-Whole

SLICE : LOAF :: ISLAND :

(a. land b. archipelago c. peninsula d. ocean)

3. Action-Object

SCRUB : FLOOR :: SCOUR :

(a. sweep b. pan c. kitchen d. cleanse)

4. Cause-Effect

WOUND : BLOOD :: ACCIDENT :

(a. damage b. case c. car d. murder)

5. Synonym

ORIGINATE : INVENT :: COPY :

(a. song b. imitate c. study d. work)

6. Antonym

CONCLUSION : ORIGIN :: ANCIENT :

(a. bored b. Greek c. novel d. marine)

7. Grammatical

SWIM : SWAM :: BURST :

(a. busted b. bursted c. burst d. blurted)

8. Numerical

9 : 3 :: 16 :

(a. 10 b. 2 c. 12 d. 4)

The booklet was designed to be self-explanatory. No extraneous instruction was given by the teacher. It took most students approximately 60 minutes to work through the booklet.

Development of the Criterion Measure

A 64-item analogy test was developed to assess the effects of the instructional unit. The test was limited to the eight types of analogies mentioned above.

The investigators began with a large pool of items from commercial sources (Turner, 1973; Leichtling, 1976). The items were then screened to ensure that they were representative of one of the eight categories and were similar in difficulty to those students might encounter on the Miller Analogies Test.

The "response position" of the items was also controlled. On analogy test items the examinee may be required to choose the correct answer in any one of four positions. The investigators suspected that item difficulty may be related to response position so this feature was controlled for analysis purposes. The following items illustrate the four response positions:

First Position

(a. aggravation b. offense c. felony d. crime):

MISDEMEANOR :: SIN : PECCADILLO

Second Position

ORATION : (a. speech b. dinner c. lecture d. chat)::

BANQUET : SNACK

Third Position

DEVIOUS : CIRCUITOUS :: (a. wielding b. assertive
c. indecisive d. yielding) : SUBMISSIVE

Fourth Position

PLAY : PROLOGUE :: CONSTITUTION : (a. preamble b. laws
c. Washington d. country).

The final test consisted of 64 analogies - eight items for each type of analogy and within each analogy type two items for each test position. All items were presented in the same format used on the Miller Analogy Test. The items were randomly ordered for the pretest and the same items were reordered for the posttest.

Results

The results of the data analysis have been organized around the four major research questions which were presented earlier.

Research Question 1

An analysis of covariance was conducted, using the analogy pretest as the covariate, to test the difference between posttest means. No significant difference was found between the experimental and control groups, $F(1,54) = .71$. The experimental group results were: pretest $M = 39.29$ ($SD = 7.87$) and posttest $M = 41.63$ ($SD = 7.42$). The control group results were: pretest $M = 40.95$ ($SD = 9.14$) and posttest $M = 42.00$ ($SD = 7.83$).

Research Question 2

The amount of pre-post gain for each type of relationship was examined to determine if instruction had been more beneficial for particular types of analogies. No major differences among analogy types were noted.

Research Question 3

The proportion of correct responses was calculated for each response position on the pretest. The results were as follows: First position - Ex = .60 and Con = .65; Second position - Ex = .69 and Con = .71;

Third position - Ex = .54 and Con = .56; and Fourth position - Ex = .57 and Con = .58. Although the proportions differed slightly on the post-test, the rank order of the positions was the same.

Research Question 4

Intercorrelations among the four Nelson-Denny reading scores and analogy pretest scores were calculated for the combined group. All reading scores, with the exception of rate, were significantly related to analogy test performance. Correlation coefficients between reading scores and analogy performance were as follows: Reading Vocabulary = .70, Reading Comprehension = .73, Reading Rate = .07, and Total Reading = .76.

Discussion

A number of conclusions can be drawn from the results of this study. However, because of the relatively small number of subjects and the idiosyncratic nature of the materials used, such conclusions should be viewed as tentative.

First, college students can improve their analogy test performance as a result of instruction. It appears, however, that such instruction may be no more effective than the practice effects derived from simply taking repeated analogy tests. In a follow-up analysis the investigators found that instruction was most effective for low-ability students. Second, instruction does not seem to favor particular types of analogies. None of the eight types of analogies used in this study were significantly

more affected than the others. Third, items requiring responses in the second position are easiest while items requiring responses in the third position are most difficult. Fourth, both reading vocabulary and reading comprehension are high correlated with analogy performance.

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